Notes:
1. Untranslatable words are replaced with asterisks (****).
2. Texts in the figures are not translated and shown as it is.

Translated: 01:00:34 JST 12/20/2008
Dictionary: Last updated 12/10/2008 / Priority: 1. Mechanical engineering / 2. Mathematics/Physics / 3. Electronic engineering

---

FULL CONTENTS

[Claim(s)]
[Claim 1] The MIG weld which supplies a pulse form current to this electrode wire 2, and welds the body 5 to be welded so that the arc 6 between the electrode wire 2 and the body 5 to be welded which are fed may be maintained Or the MIG weld characterized by changing the roughness and fineness of the pulse spacing periodically, and proportioning the feeding rate of the electrode wire 2 in this impulse-wave consistency in a MAG welding process as a value in which one droplet generates a current for every impulse wave or a MAG welding process.
[Claim 2] The MIG weld which supplies a pulse form current to this electrode wire 2, and welds the body 5 to be welded so that the arc 6 between the electrode wire 2 and the body 5 to be welded which are fed may be maintained Or while controlling the current supply source apparatus 11 in a MAG welder to change periodically the roughness and fineness of the feeding apparatus 10 of the electrode wire 2, the current supply source apparatus 11 to the electrode wire 2, and the pulse spacing of a current The MIG weld characterized by having the control device 12 which controls the feeding apparatus 10 so that a feeding rate is proportional to the impulse-wave consistency, or a MAG welder.

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention supplies a pulse form current to this electrode wire so that the arc between the electrode wire and the body to be welded which are fed may be maintained, and it is related with the MIG weld characterized by forming and welding a scales-like beat to a welded section or a MAG welding process, and its apparatus.
[0002]
[Description of the Prior Art] They are TIG weld and MIG (metal inert gas) as what supplies an

impulse-wave current to an electrode like the weld between edges of the former, for example, a metallic conduit, when the perimeter of the comparison part needs to be welded. Weld or MAG (metal active gas) There is weld. The former TIG weld is the approach of welding, while it has the electrode of an electrode, and it and another object and both are around gone to a uniform direction, and since 1 time of the amount of welds is small, there is a defect to which the weld time becomes long. This weld supplies an impulse-wave current to an electrode, fuses a base material, and, subsequently performs melting **** welding operation for an electrode. In this weld, by adjusting that spacing, an impulse-wave current controls the input calorie to a base material, and tries to perform optimal weld.

[0003] Next, latter MIG weld and MAG weld have 1 time of the large amount of welds compared with said TIG weld. The impulse-wave current in this case does not stop only at controlling the input calorie to a base material, but emits a droplet from the head of an electrode. That is, electromagnetic force works to an electrode tip with feed of an impulse-wave current, and the molten metal of an electrode tip is turned to a base material what is called according to the pinch effect, and it emits. The maximum of the impulse-wave current and a ripple are set up to demonstrate the pinch effect enough. In addition, others are substantially the same although MAG weld differs from it of MIG weld of the shielding gas. Then, both are summarized and it explains as a MAG welding process.

[0004] Drawing 8 is an apparatus block diagram for explaining the principle of the conventional MAG welding process. The electrode wire 2 wound around the coiling roll 1 in drawing 8 is fed into weld with constant speed by the feeding apparatus 3 which has the driving roller of a pair. While a pulse form current is supplied to the electrode wire 2 fed from the current supply source apparatus 4 and arc 6 is formed in the welded section of the body 5 to be welded of it, a droplet is emitted to a base material from an electrode tip. Setting out of the rate of these feeding apparatus 3, current control of the current supply source apparatus 4, etc. are performed by the control device 7. In addition, a gas-shield part is omitted for convenience and drawing 8 shows it. By such MAG weld, in order to have welded the perimeter of tubing, edge preparation was beforehand performed to the comparison part of tubing, and the electrode needed to be moved to the upper part from the lower limit of the tubing, it needed to weld every [single-sided], and the adverse effect by the lappet omission of molten metal needed to be lost. In that case, the weld lappet could not but weld the perimeter of tubing by the welding condition of the tubing bottom which poses a problem. At this time, the frequency of the weld impulse wave of a welding condition had to be lessened comparatively, and could not but make small heat input of weld per specified time. Then, weld efficiency will fall.

[0005] Next, also when MAG weld of the plane comparison part was carried out, edge preparation was usually beforehand performed to the base material of weld. At this time, an electrode may be moved in the shape of [zigzag] meandering to the case where an electrode

is linearly moved along the bottom of thread of a groove, and the bottom of thread of a groove. Anyway, when supplying an impulse-wave current to an electrode at fixed spacing, if the pulse spacing is too brief, an input calorie will increase, and there is a possibility that molten metal may flow out of the bottom of thread of a groove into the underside side, and may wake up a poor weld. Moreover, if spacing of an impulse-wave current is too long, an input calorie becomes small, it becomes poor [the penetration of a base material], and there is a possibility that the dependability of weld may be missing. So, it was very troublesome to have set up the optimal pulse spacing, and it was what requires an experience.

[0006] Moreover, even if it set up the optimal possible pulse spacing, the case where the penetration width and the penetration depth of a groove part were not enough often existed. This is because it may become insufficient [penetration], or a base material may melt and **** may happen by slight change of pulse spacing. In the case of the narrow gap as for which groove width becomes very narrow especially, that appears notably. This is because an electrode must be linearly moved along the bottom of thread of a groove. In addition, the merits and demerits of the aforementioned pulse spacing appear as a result considering the ripple of each impulse wave, and maximum as fixed, then a power supply per unit time, and it becomes an input calorie per unit time. Moreover, this can also be caught with the effective current per unit time, or average current.

[0007]

[Problem to be solved by the invention] It was very difficult to control a weld impulse wave by the above-mentioned conventional MAG welding process, securing the dependability of weld as welding operation is quick. Then, this invention makes it a technical problem to solve the problem in such a conventional MAG welding process.

[0008]

[Means for solving problem] That is, invention according to claim 1 is the MIG weld which supplies a pulse form current to this electrode wire, and welds the body to be welded so that the arc between the electrode wire and the body to be welded which are fed may be maintained, or a MAG welding process. And this approach changes the roughness and fineness of the pulse spacing periodically as a value in which one droplet generates a current for every impulse wave, and is characterized by proportioning the feeding rate of an electrode wire in this impulse-wave consistency.

[0009] Since it is made as [be / moreover / the droplet supplied to weld is continuously supplied with roughness and fineness, and / proportional to the consuming speed / the feeding rate of an electrode wire] according to the above-mentioned approach Periodic enlarging or contracting of molten-metal Poole can be performed smoothly, and the lappet omission from molten-metal Poole is controlled by it. It is because dislodging of heat to the direction of movement of weld can be prevented as much as possible while this restricts heat input in the

period when pulse spacing is sparse while it can enlarge an input calorie in the period when pulse spacing is dense and can take the large melting width and the large melting depth of a base material, and it makes fluidity of molten metal small. Thereby, the penetration width and the depth of a base material can prevent the lappet omission of molten metal greatly. Therefore, it can weld promptly by the ability welding the perimeter of line weld in the fixed direction. and since lappet omission is controlled, an impulse wave can increase the welding current of the dense section -- both, since the amount of supply of a wire can be increased, 1 time of the amount of welds increases as a whole, and it can weld promptly also from the point. Moreover, since the wire amount of supply can be increased while being able to supply the bigger welding current in the dense impulse-wave section in this invention when the input calorie of weld is made the same as conventional it, the penetration width and the penetration depth of weld can be enlarged. Thereby, the dependability of weld improves.
[0010] Moreover, invention according to claim 2 is the MIG weld which supplies a pulse form current to this electrode wire, and welds the body to be welded so that the arc between the electrode wire and the body to be welded which are sent out may be maintained, or a MAG welder. And [an apparatus] while this apparatus controls a current supply source apparatus to change periodically the roughness and fineness of the feeding apparatus of an electrode wire, the current supply source apparatus to an electrode wire, and the pulse spacing of a current It is characterized by having the control device for controlling a feeding apparatus so that the feeding rate of an electrode wire is proportional to the impulse-wave consistency. And this apparatus is suitably used, in order to enforce MIG weld according to claim 1 or a MAG welding process.
[0011]
[Mode for carrying out the invention] Next, the form of operation of this invention is explained based on Drawings. Drawing 1 is an apparatus block diagram for explaining the principle of the MAG welding process of this invention. The electrode wire 2 wound around the coiling roll 1 is fed into weld at the rate of predetermined [which was adjusted by the feeding apparatus 10 which has the driving roller of a pair]. The pulse form current of the current supply source apparatus 11 is supplied to the electrode wire 2 fed, and arc 6 is continuously formed in the welded section of the body 5 to be welded of it. The apparatus equipped with the pulse motor which rotates, for example by an impulse-wave input, and the driving roller connected with the output shaft as a feeding apparatus 10 can be used. Moreover, as a current supply source apparatus 11, the welding-source apparatus usually used in this field can be used. The rate of these feeding apparatus 10, the pulse form current of the current supply source apparatus 11, etc. are controlled by the control device 12. In addition, also in drawing 1 , a gas-shield part is omitted for convenience and shown.
[0012] The control device 12 has the current pulse control part 13, the feeding speed-control

part 14, and the timer apparatus 15. An impulse-wave birth means by which the current pulse control part 13 generates two kinds of pulse train signals whose pulse spacing of sparse **** is dense inside, Sparse **** switched by the means for switching which switches the roughness and fineness periodically with the interval beforehand set as the timer apparatus 15, and the means for switching includes an output means to output a dense pulse control signal to the current supply source apparatus 11. And the current supply source apparatus 11 supplies the current of pulse spacing like drawing 2 to the electrode wire 2, for example. Namely, the current that the period A when pulse spacing is dense, and the period B when pulse spacing is sparse are repeated by turns with a given period is supplied to the electrode wire 2. Five droplets occur from an electrode wire, and make molten-metal Poole of weld expand according to each pulse form current in Period A, and three droplets occur from an electrode wire according to each pulse form current in Period B. And molten-metal Poole is made to expand by the period A when the consistency of droplet spacing is high, and molten-metal Poole is made to reduce by the period B when a droplet consistency is low.
[0013] A comparison means by which the feeding speed-control part 14 compares said control signal from the current pulse control part 13 with the signal from the speed detection machine 16 which detects the rate of the feeding apparatus 10 in drawing 1 , An output means to output the feeding speed control signal which makes a feeding rate fluctuate with the signal of the positive/negative from a comparison means to the feeding apparatus 10 is included. In addition, as a speed detection machine 16, a rotary encoder, a tachometer, etc. which were connected with the output shaft of the feeding apparatus 10, for example can be used.
[0014] Drawing 3 is the comparison figure of the weld welded with the conventional MAG welding process when seting swing width of an electrode constant, and the weld welded with the MAG welding process of this invention while seting the input calorie of weld constant. Although further explained in full detail in the work example mentioned later In this example, an electrode is compared, crosswise [of weld], the impulse-wave current of roughness and fineness is supplied by this invention in a right-and-left rundown location and its neighborhood by a diagram, and a fixed impulse-wave current is conventionally supplied by the type approach. [in the groove department] In addition, the weld electrode is moving in the direction of the bottom-of-thread line of the groove of weld with constant speed also in a rundown location and a WIBINGU location on either side. And when the input calorie which is both a method is constant, since the average effective current is constant, in type, the amount of supply of the molten metal is conventionally uniform. By this invention, average supply current and the wire amount of supply become less in right-and-left both the rundown location and its neighborhood in the increase of supply current and its wire amount of supply, and the mid-position to it. As a result, the melting [direction / of this invention] acreage at the time of each rundown and a melting depth increase. Then, in the comparison weld which carried out the

groove, weld width differs from a welding condition like the lowest stage of drawing 3 with both welding processes. And in this invention, the penetration depth of weld and the penetration width of weld are large, and weld reaches deeply in the wall surface of a groove. On the other hand, the conventional approach may not be enough as the penetration width and the penetration depth of weld.

[0015] Next, if how to carry out MAG weld using the above-mentioned apparatus is explained, while setting the output current of the current supply source apparatus 11 as the value which becomes 1 impulse-wave 1 droplet first, the interval of the period of a current impulse wave of condensation and rarefaction is set up with the timer apparatus 15. By pushing the starting switch which is not illustrated, start an apparatus and the pulse control signal of spacing with dense sparse **** is outputted to the current supply source apparatus 11 with the interval set up from the current pulse control part 13. As it shows to the electrode wire 2 at drawing 2 , it superimposes on fixed base current and the pulse form current of spacing with dense sparse **** is supplied periodically. On the other hand, the feeding speed-control part 14 outputs the feeding speed control signal corresponding to the of-condensation-and-rarefaction pulse control signal from the current pulse control part 13 to the feeding apparatus 10 from the output means, and the feeding apparatus 10 makes the feeding rate of the electrode wire 2 fluctuate with the feeding speed control signal. And the feeding rate of the electrode wire 2 is detected with the speed detection machine 16, and is fed back to the comparison means of the current pulse control part 13. Since the electrode wire 2 is supplied to weld at the rate correctly proportional to the consuming speed even when backlash exists in the output shaft of the result 10, for example, a feeding apparatus, etc., the arc in weld is stabilized and uniform weld can be continued.

[0016] Thus, by proportioning the amount of feeding in consuming speed, while supplying the current of of-condensation-and-rarefaction pulse form to the electrode wire 2 A continuous uniform scales-like beat can be formed in weld in high efficiency, enlarging or contracting of molten-metal Poole being smoothly repeated continuously under the stable arc, and controlling the lappet omission from molten-metal Poole by it.

[0017]

[Work example 1] Next, the example which carried out MAG weld according the weld between edges of a metallic conduit to the approach of this invention is shown using an apparatus like drawing 1 . Two tubing (construction material: STPG370) with aperture 300mmphi, 10.3mm [in thickness], and a circumference of 1000mm was prepared as a metallic conduit, and between those edges was compared and welded like drawing 4 . At this time, it opened 4mm in width between the troughs of a comparison part, and it made the groove 32.5 degrees. And the electrode wire 2 uses 1.2mm in diameter of Z3312-YGW12 of JIS. The many origin of the impulse-wave current supplied from the current supply source apparatus 11 is as in Table 4.

That is, as for the peak current of the impulse wave, during Imax =430A and its peak period is setting 2msec and base current to I0 =30A and base time =4.8 - 16.3msec. Each pulse number at that time is 55Hz - 147Hz. Moreover, the wire feed per revolution is 5.5 m/min - 2.75 m/min. The effective values of each current are 153A-76A.

[0018] And the first layer was made into the manual weld of TIG, and it carried out so that a residual layer might be around gone by MAG automatic welding by the approach of this invention. That is, while repeating the dense impulse-wave region and the sparse impulse-wave region by turns, the wire feed per revolution was changed in proportion to the roughness and fineness of the impulse wave. The two pass eye of the setting-out conditions of the MAG weld is as Table 1 and 3 pass eye being Table 2. These conditions were defined in consideration of the stability of weld, and the quick nature of weld based on the experiment. As shown in the result table 3, time until it completes comparison weld was needed for 23 minutes.

[0019]

Weld by the approach of this invention (they are those with of condensation and rarefaction to an impulse-wave period)

First layer (one pass eye) Manual-weld (TIG weld) two pass eye (0 degree - 360 degrees)

[Table 1]

		溶接位置	
		A～D	E～H
密パルス域	周波数 Hz 送り量 m/min 時間 sec	147 5.5 0.1	114 4.5 0.3
疎パルス域	周波数 Hz 送り量 m/min 時間 sec	80 3.5 0.2	63 3.0 0.3
溶接速度 肉盛量 溶着量	mm/min mm g/min	175 3.3 37.0	100 4.3 29.8

[0020] 3 pass eye (0 degree - 360 degrees)

[Table 2]

		溶接位置		
		A～C	D～E	F～H
密パルス域	周波数 Hz 送り量 m/min 時間 sec	80 3.5 0.1	80 3.5 0.2	80 3.5
疎パルス域	周波数 Hz 送り量 m/min 時間 sec	55 2.75 0.2	61 2.9 0.2	80 3.5
溶接速度 肉盛量 溶着量	mm/min mm g/min	60 4.4 26.6	60 4.5 27.5	90 3.3 31.1

[0021]
[Table 3]

溶接時間		アーク時間	ヘッド戻り時間	＋α（＊1）
2パス目	0° → 360°	7分50秒	−	30秒
3パス目	360° →0°	14分40秒	−	−
		合 計	23分	

[(*1): +alpha -- crater disposal and blowpipe up-and-down time]
[0022] Condition [Table 4] used by all position MAG weld

パルス周波数	ピーク電流(A)	ピーク時間(msec)	ベース電流(A)	ベース時間(msec)	ワイヤ送り量(m/min)	実効電流値(A)
147	430	2.0	30	4.8	5.5	153
114	430	2.0	30	6.8	4.5	125
80	430	2.0	30	10.5	3.5	97
63	430	2.0	30	13.8	3.0	83
61	430	2.0	30	14.5	2.9	81
55	430	2.0	30	16.3	2.75	76

[0023] Next, automatic welding by the conventional MAG welding process was tried as a comparative example. The welding condition is as in Table 5. As shown in Table 6, the completion time of weld required the result for 37 minutes and 30 seconds.
[0024] Comparative example (impulse-wave period regularity)
First layer (one pass eye manual weld)
A two pass - 4 pass eye [Table 5]

	溶接位置	
	D～A	F～H
周波数 Hz	110	110
送り量 m/min	4.3	4.3
溶接速度 mm/min	100	100
肉盛量 mm/min	3.4	3.4
溶着量 g/min	21.5	21.5

[0025]
[Table 6]

溶接時間		アーク時間	ヘッド戻り時間	+α（＊1）
2パス目	180°→0°	5分	1分	30秒
	180°→360°	5分	1分	30秒
3パス目	180°→0°	5分	1分	30秒
	180°→360°	5分	1分	30秒
4パス目	180°→0°	5分	1分	30秒
	180°→360°	5分	1分	−
		合 計	37分30秒	

[(*1): +alpha -- crater disposal and blowpipe up-and-down time]

[0026] Therefore, it turned out that the welding process of this invention can be promptly welded 39% compared with the conventional approach. Conventionally at this time, the welding condition in type weld was performed so that a first layer might be made into the manual weld of TIG like the above and a residual layer might be made right and left a semicircle every from the underside of tubing by MAG automatic welding, respectively. In addition, in the case of this conventional approach, the frequency and wire feed per revolution of the impulse wave were set constant. The welding condition is as in Table 5. This welding condition was conventionally provided in the optimal thing in consideration of the stability of weld, and the quick nature of weld based on the experiment in the type welding process.

[0027] Moreover, this pulse frequency and a wire speed of supply are set as the greatest value which does not hang down and fall, while molten metal welds. As a result, with a type welding process, the molten-metal amount of supply from an electrode is 21 g/min conventionally. It is, the amount of supply increased the direction of the approach of this invention by 1/3, and it turned out that welding operation can be performed promptly. Furthermore, when putting molten metal on a multilayer, in this invention, the welding operation can be performed continuously that what is necessary is just to go around repeatedly to a uniform direction. On the other hand, by the right-and-left distribution approach, the activity which returns an electrode to the lower limit of tubing for every semicircle, and the recovery time for it were needed, and many working hours were needed as a whole.

[0028]

[Work example 2] Next, the comparative experiments of the type welding process were

conventionally conducted to the welding process of this invention when carrying out WIBINGU weld by the welding condition of the same input calorie on the flat surface. That is, like drawing 7 , 6-mm-thick plate material was piled up, Groove V was 18mm at upper plate material, and the next condition comparative experiments were conducted. It is referred to as the maximum 480A of an impulse-wave current, base current 50A, and maximum current time 2msec, and is referred to as base current time 2.8msec. And by the approach of this invention, it is considered as the dense pulse frequency of 333Hz (effective current 333A), and the sparse pulse frequency of 87Hz (effective current 125A), and the average effective current is repeatedly set to 230A both same time by turns. the conventional approach -- pulse frequency -- 208Hz (effective current 230A) -- it was presupposed that it is fixed. As a result, in the direction of the approach of depending on this invention, the penetration width W of the penetration width in 22mm and the conventional approach was 18mm. Moreover, although the penetration spot appeared in the rear-face side of a lower metal plate by the approach of this invention, there was no it by the conventional approach. Thereby, it turned out that the approach of this invention is excellent in penetration width and a penetration depth compared with a former type approach. Both the WIBINGU width at this time is 10mm and welding speed 100 mm/min. The electrode was moved to flat-surface trapezoidal shape.

[0029]

[Work example 3] Since the manual weld of the first layer was carried out in said work example 1, the work example which carried out MAG weld from the first layer next is explained. That is, the example which carried out MAG weld according the weld between edges of a metallic conduit to the approach of this invention is shown using an apparatus like drawing 1 . Two tubing (construction material: STPG370) with aperture 300mmphi, 10.3mm [in thickness], and a circumference of 1000mm was prepared as a metallic conduit, and between those edges was compared and welded like drawing 4 . At this time, it opened 1mm in width between the troughs of a comparison part, and it made the groove 30 degrees. And the electrode wire 2 uses 0.9mm in diameter of Z3312-YGW12 of JIS. As for the many origin of the impulse-wave current supplied from the current supply source apparatus 11, during Imax =430A and its peak period is setting 2msec and base current to I0 =30A, base time 0.6 - 7.9msec for the peak current of the impulse wave. Each pulse number at that time is 101Hz - 3807Hz. Moreover, the wire feed per revolution is 4.0 m/min - 12.0 m/min. The effective values of each current are 1313A-310A.

[0030] And it carried out so that it might go around by MAG automatic welding from a first layer. That is, while repeating the dense impulse-wave region and the sparse impulse-wave region by turns, the wire feed per revolution was changed in proportion to the roughness and fineness of the impulse wave. The one pass eye of the setting-out conditions of the MAG weld is as Table 7 and a two pass eye being Table 8. These conditions were defined in

consideration of the stability of weld, and the quick nature of weld based on the experiment. As shown in the result table 9, time until it completes comparison weld was needed for 21 minutes.

[0031]

Weld by the approach of this invention (they are those with of condensation and rarefaction to an impulse-wave period)

First layer (one pass eye)

[Table 7]

		溶接位置	
		A～D	E～H
密パルス域	周波数 Hz 送り量 m/min 時間 sec	380 12.0 0.5	345 11.0 0.2
疎パルス域	周波数 Hz 送り量 m/min 時間 sec	204 7.0 0.1	204 7.0 0.1
溶接速度 肉盛量 溶着量	mm/min mm g/min	250 5.8 55.7	250 5.6 51.6

[0032] Two pass eye (0 degree - 360 degrees)

[Table 8]

		溶接位置		
		A～C	D～E	F～H
密パルス域	周波数 Hz 送り量 m/min 時間 sec	189 6.5 0.5	189 6.5 0.7	189 6.5 0.5
疎パルス域	周波数 Hz 送り量 m/min 時間 sec	101 4.0 1.29	112 4.3 1.13	112 4.3 1.13
溶接速度 肉盛量 溶着量	mm/min mm g/min	60 4.8 23.5	60 5.1 25.7	90 4.8 24.9

[0033]
[Table 9]

溶接時間		アーク時間	ヘッド戻り時間	＋α（＊1）
1パス目	0° → 360°	4分00秒	－	30秒
2パス目	360° →0°	16分40秒	－	－
		合 計	21分10秒	

[(*1): +alpha -- crater disposal and blowpipe up-and-down time]
[0034]
[Effect of the Invention] As mentioned above MIG weld according to claim 1 Or [a welding process] since a MAG welding process changes the roughness and fineness of the pulse spacing periodically as a value in which one droplet generates a current for every impulse wave and it was made to proportion the feeding rate of an electrode wire in this impulse-wave consistency While being stabilized, being able to perform smoothly periodic enlarging or contracting of molten-metal Poole and the lappet omission from molten-metal Poole being effectively controlled by it Since the welding current in the section where an impulse wave is dense, and the wire amount of supply at that time can be increased, 1 time of the amount of welds and a melting depth are increased, and quick weld and reliable weld can be secured simultaneously. Moreover, since the lappet omission of molten metal can prevent effectively, it

becomes possible to go around and weld the perimeter of a line in the fixed direction, and quick weld can be performed.

[0035] [next, MIG weld according to claim 2 or a MAG welder] While controlling a current supply source apparatus to change periodically the roughness and fineness of the feeding apparatus of an electrode wire, the current supply source apparatus to an electrode wire, and the pulse spacing of a current It has the control device which controls a feeding apparatus so that a feeding rate may be proportional to the impulse-wave consistency, and in order to enforce MIG weld according to claim 1 or a MAG welding process, it is used suitably.

[Brief Description of the Drawings]

[Drawing 1] The apparatus block diagram for explaining the principle of the MAG welding process of this invention.

[Drawing 2] Drawing showing periodic change of the pulse form current supplied to an electrode wire by the current supply source apparatus in the MAG welding process of this invention.

[Drawing 3] The comparison figure of the weld welded with the conventional MAG welding process when seting the input calorie of weld constant, and the weld welded with the MAG welding process of this invention.

[Drawing 4] The cross-sectional explanatory view of the line welded automatically, respectively with the MAG welding process and the conventional MAG welding process of this invention.

[Drawing 5] The explanatory view of the welding sequence by the MAG welding process of this invention.

[Drawing 6] The explanatory view of the welding sequence by a former type MAG welding process.

[Drawing 7] The cross-sectional explanatory view of the object which welds a flat surface automatically, respectively with the MAG welding process and the conventional MAG welding process of this invention.

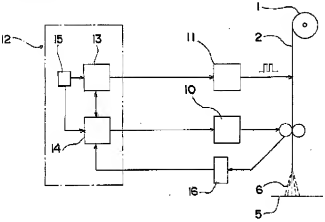
[Drawing 8] The apparatus block diagram for explaining the principle of the conventional MAG welding process.

[Explanations of letters or numerals]

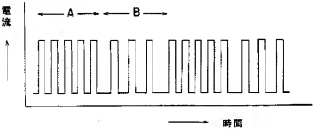
1 Coiling Roll
2 Electrode Wire
3 Feeding Apparatus
4 Current Supply Source Apparatus
5 Body to be Welded

6 Arc
7 Control Device
10 Feeding Apparatus
11 Current Supply Source Apparatus
12 Control Device
13 Current Pulse Control Part
14 Feeding Speed-Control Part
15 Timer Apparatus
16 Speed Detection Machine

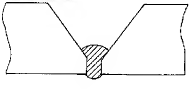
[Drawing 1]



[Drawing 2]

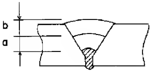


[Drawing 4]

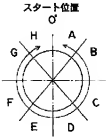


[Drawing 5]

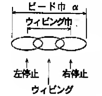
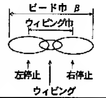
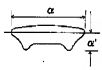
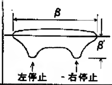
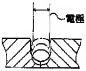
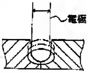
(A)



(B)

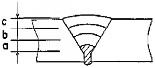


[Drawing 3]

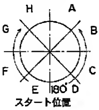
	従来	本発明	
ビード巾			α＜β
溶込深さ			α'＜β'
開先き溶接部断面			

[Drawing 6]

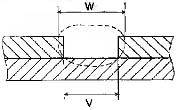
(A)



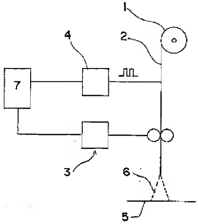
(B)



[Drawing 7]



[Drawing 8]



[Translation done.]